Intro to Behaviorism

- The Scientific Method
  - Watson
- Classical Conditioning
  - Pavlov
- Operant Conditioning
  - Skinner

Definition: Learning

- Changes in behavior as a result of experience
  - Exclude fatigue, injury, drug effects
- Long-term effect

John B. Watson (1878-1958)

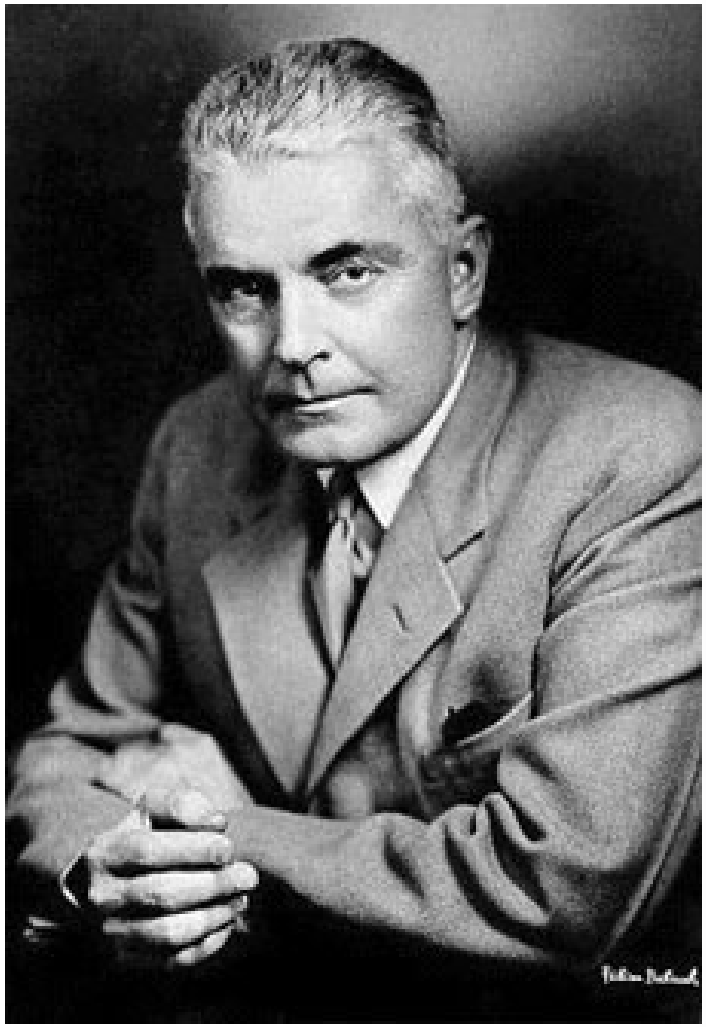
"Give me a dozen healthy infants, well-formed, and my own specified world to bring them up in and I'll guarantee to take any one at random and train him to become any type of specialist I might select – doctor, lawyer, artist, merchant-chief, and yes, even beggar-man and thief, regardless of talents, penchants, tendencies, abilities, vocations and race of his ancestors. I am going beyond my facts and I admit it, but so have the advocates of the contrary."

- John Watson

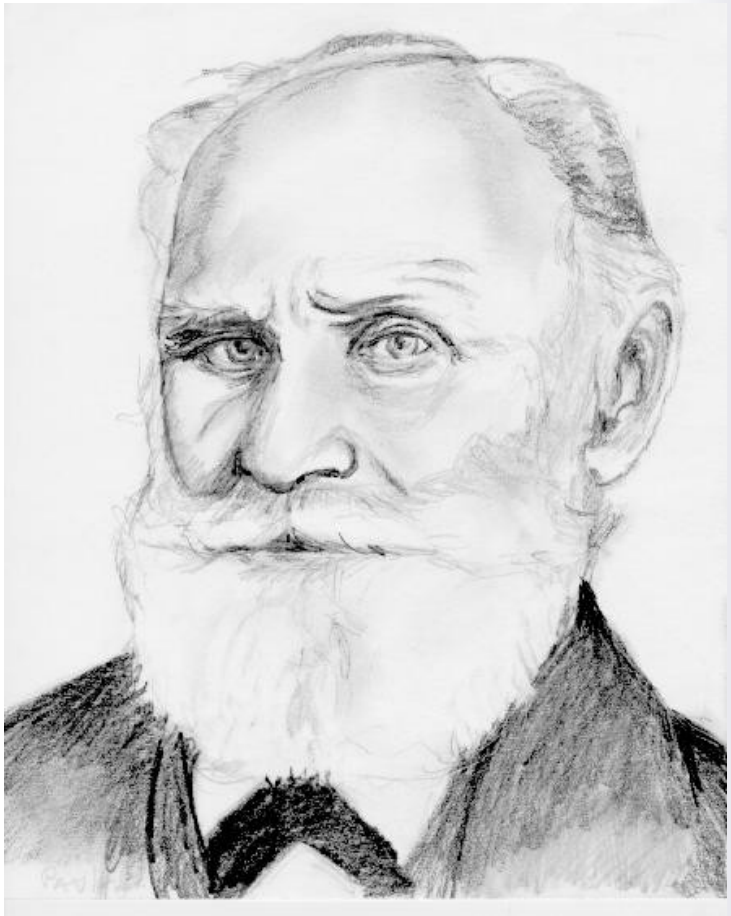
(Radical Behaviorism)

Behaviorism

- No innate ability
- No mental states
  - Ideas
  - Beliefs
  - Desires
  - Feelings
- Subjective concepts disallowed



Ivan Pavlov (1849-1936)

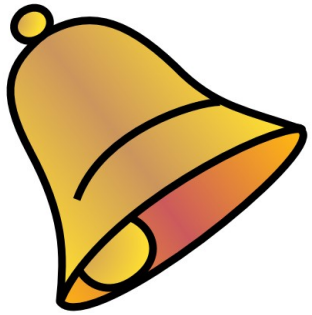


- "Psychic salivation"
  - Ringing bell became associated with food, causing salivation

- Unconditioned stimulus-response
  1) Stimulus (S): food
  2) Response (R): salivation

Conditioning: Step 1

Neutral stimulus (NS)
(tone)



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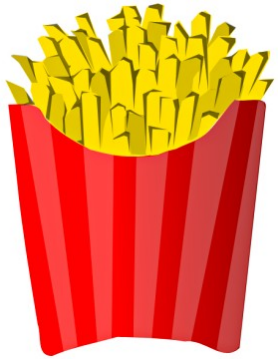
Unconditioned Stimulus (UCS)
(food)



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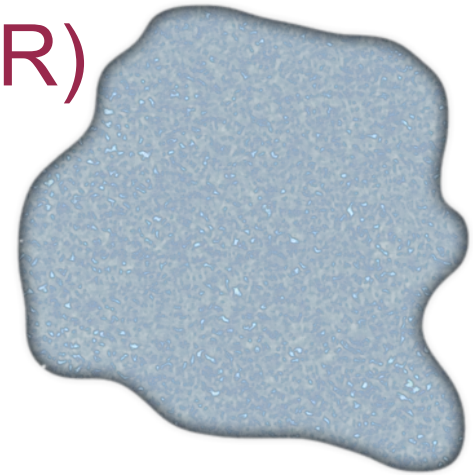
Unconditioned Response (UCR)
(salivation)



Conditioning: Step 2

- NS becomes Conditioned Stimulus (CS)
- UCR becomes Conditioned Response (CR)

CS (tone) >> CR (salivation)

- *New* association between *existing* stimuli (NS+UCS)
- Order is important: (1) NS, (2) UCS
  - Must be repeated – NS reliably predicts UCS

Extinction

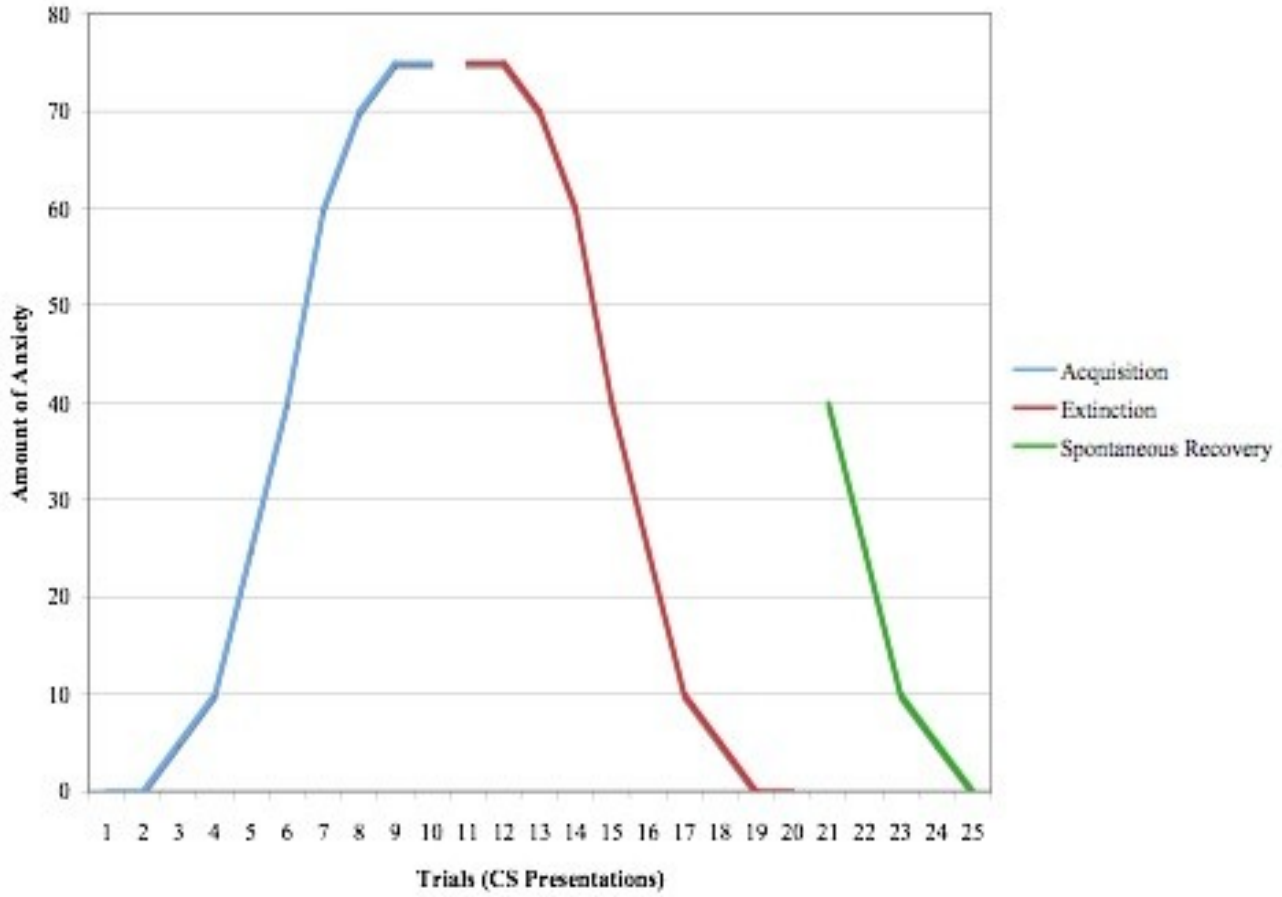
- What if NS does *not* predict UCS?

- Response fades
  - Rate of extinction varies by stimulus and response
    - Emotional content
    - Intensity level

Spontaneous Recovery

- After extinction, CS can again have an effect if there has been a rest period
- Typically weaker
- Extinguishes faster

Graphs = Science



Stimulus Generalization

- What if another, similar stimulus is used?
  - What is similarity? (remember, must be measurable)
  - How can stimuli be categorized?
- Tendency to generalize
  - Similarity is determined retroactively (i.e. if CS_1 produces strong response, and CS_2 produces weak response, not similar)
- But what if we need to distinguish between similar stimuli?

Stimulus Discrimination

- Generalized stimuli can be discriminated *through training*
  - Implication: natural tendency to generalize
  - Ability to discriminate is *adaptive*
- Dependent on experience

Value of Classical Conditioning

- Anticipate environmental events – even those that we haven't directly experienced
- “Blocking”: If new NS is presented with CS, conditioning to new stimulus does not occur – it is redundant
- Primarily reflexive, so possibly limited value to describe humans
  - Maybe not...

Case Study – Little Albert

- Conditioned emotional response
- Generalization

- Experimental setup:
  - 11-month-old boy
  - NS: white rat
  - UCS: gong
  - UCR: crying
- Problems with extinction

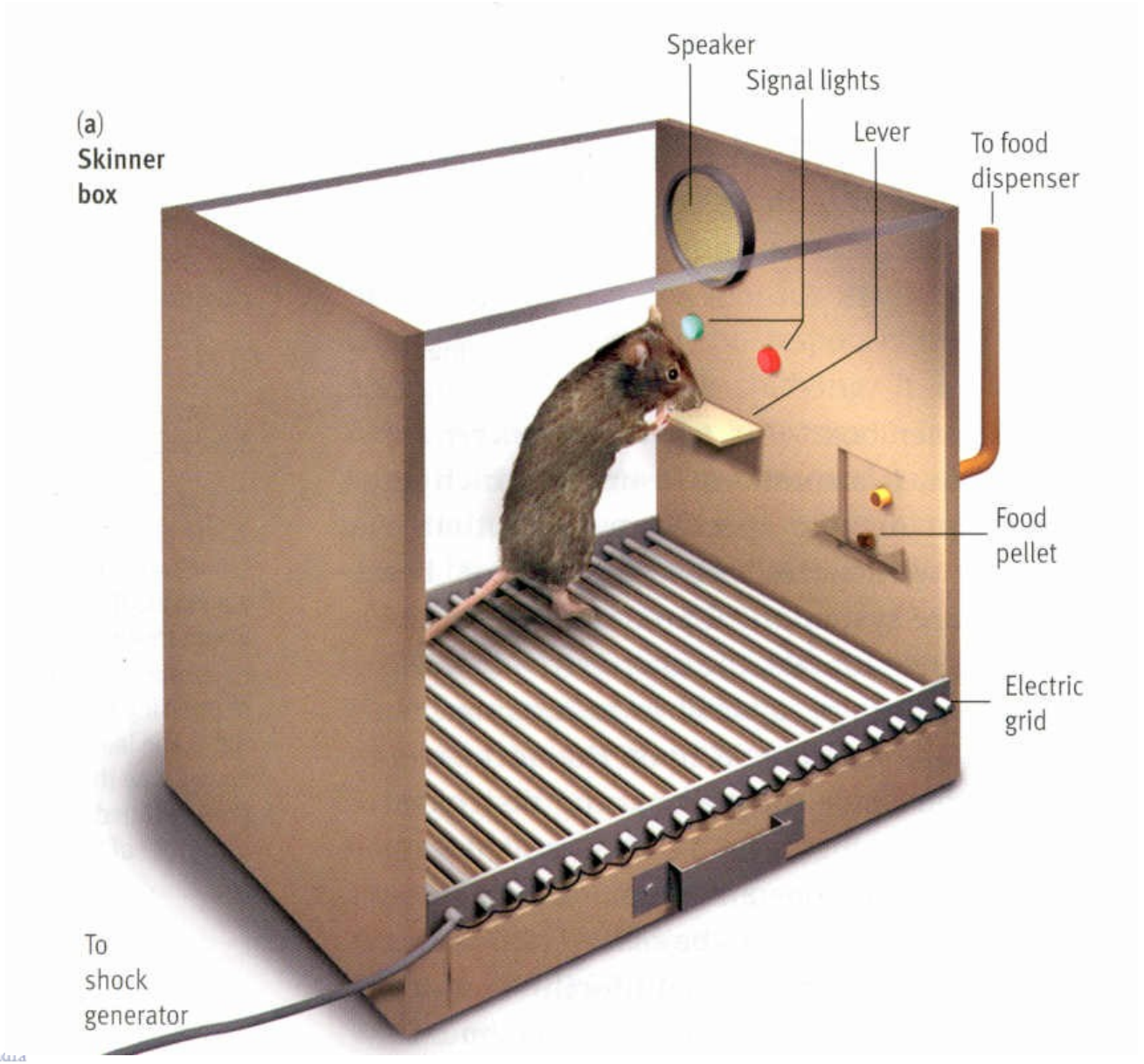
Further Research

- Drug an Immune responses
  - Research question: can we have a conditioned response that mimics drug effects?
  - Smell of coffee, being in a pub, etc.
- Sometimes mimic, sometimes oppose
  - Why?
- Immune response?
  - Rats given saccharine + immune depressant (Ader and Cohen, 1975)

B. F. Skinner (1904-1990)

- Developer of Operant Condtioning
- Research methods, analysis
- Three requirements:
  1) Environment
  2) Behavior
  3) Consequences of behavior

Skinner Box


(a)
Skinner box
Speaker
Signal lights
Lever
To food dispenser
Food pellet
Electric grid
To shock generator

Operant Conditioning

- Operant: behavior *emitted* by an organism
  - "voluntary", without the free will
- It's all about the consequences
- Usually focuses on *frequency* of behavior
  - Other factors may be more useful, but often ignored:
    - Intensity
    - Duration
    - Dyanmics

Reinforcement

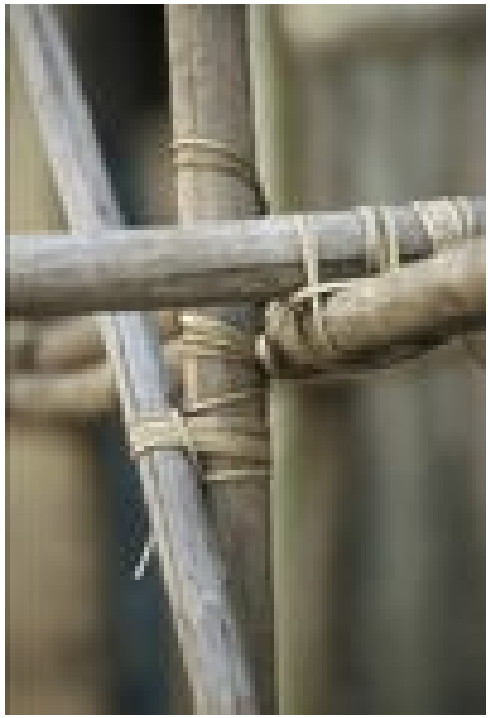
- *Always* results in *increase* in likelihood of response
- How?

Reinforcement

- *Always* results in *increase* in likelihood of response
- How?

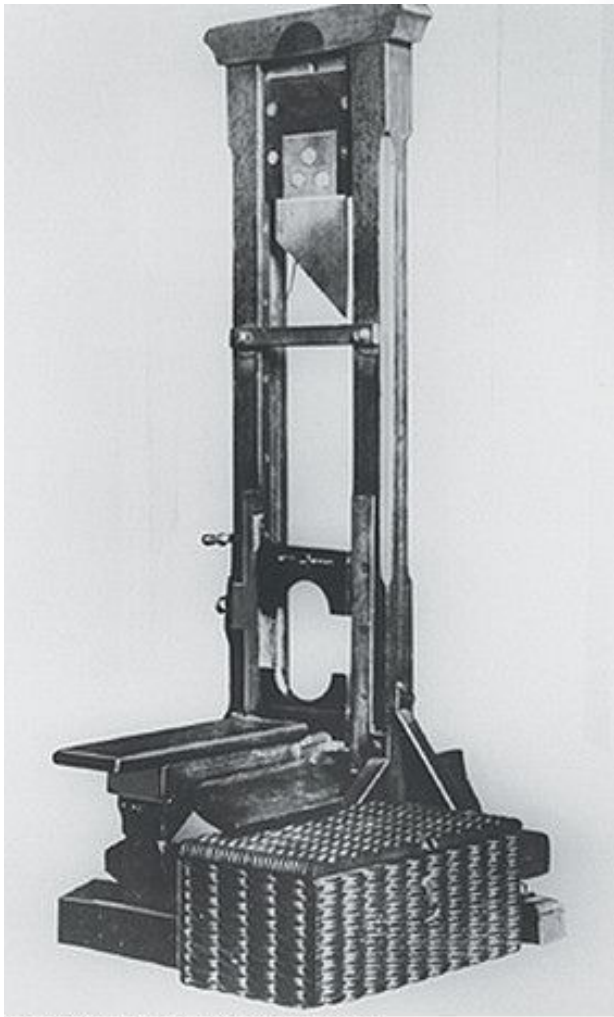
a)Positive: provide reward

b)Negative: remove aversive stimulus



Punishment & Omission

- How do we *reduce* the frequency of behavior?
- Punishment: provide negative/aversive stimulus
- Omission: remove positive/rewarding stimulus



Important Note

- The quality of the stimulus (negative/positive) is determined *by the organism being conditioned*

  - Different organisms have different values

  - A single organism can change its mind

Shaping

- Complex behaviors?
  - Walking
  - Writing
  - Making pottery

- "Behavioral drift": changes in behavior w/o reinforcement – generally random
- Reward *successive approximations* of behavior

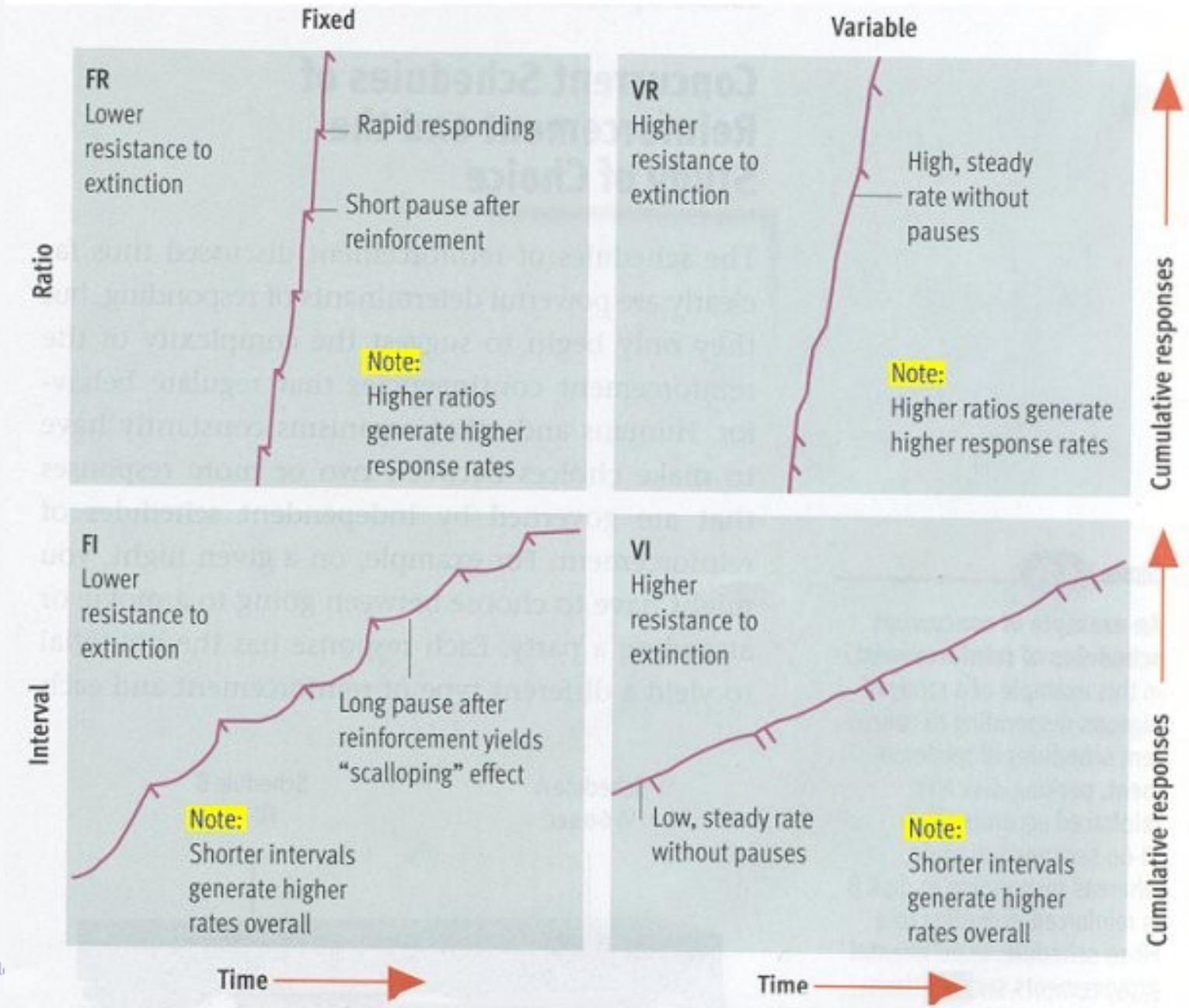
Extinction part Deux

- What happens if reinforcement ceases?
- How does this differ from punishment?

Reinforcement Schedules

- True extinction (no reinforcement) and continuous reinforcement is rare
- Therefore, partial reinforcement, 4 types
  - Variable, Fixed *Ratio*
  - Variable, Fixed *Interval*
- Effects on frequency of behavior?

Graphs of Reinforcement Schedules



Fixed Ratio

- Example: wage based on output
  - Larger ratio tends to increase output
    - Why?
    - Always?
- Relatively steady response

Variable Ratio

- Example: Slot machines
- Slightly better performance than fixed ratio – unpredictability of reward increases output
- Steady response
- Resistant to extinction

Fixed Interval

- Example: Hourly wage
  - What is being reinforced?
- Example: medication
- Responses happen primarily at the end of each interval – slow accumulation of responses
- Example: Legislation?

Variable Interval

- Example: pop quizzes!
- Steady response, but slower than ratio schedules
- Resistant to extinction

Superstition

- Non-contingent reinforcement
  - Inconsistent reinforcement
  - Reinforcement regardless of behavior
- Animals good at perceiving causal links, *even when they don't exist*
- e.g. Getting elevator doors to close, pre-game rituals, coincidence

Aversive Control

- Reinforcement is most effective *immediately* following the behavior
  - When do we punish people?
- Punishment encourages avoidance
  - Use of punishment as motivator?

Aversive Control (cont.)

- Punishment *suppresses* rather than *extinguishes* behavior
  - Must be continuous (partial application does not work well)
- Is there a better way?

Combining CC and OC

- Therapy
- Fear
  - Classical approach?
  - Operant approach?
  - Does one affect the other?
- Education
- Habits
- Career Choice? Morality? Discrimination? Friendship?